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Adopting Inflation Targeting in Dollarized Transition Economies: Impact on Credit to Real Economy

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Abstract:

In this paper we analyze the credit booms in transition economies under different monetary policy regimes. We show that incentives for credit demand may differ under various monetary policy regimes. It might be consequent to different patterns of economic agents' behavior at the credit market in case of hard peg, but not obviously because of the "less than credible monetary policy". In countries with successful exchange rate pegs an incentive to additional borrowing might origin from the lower exchange rate risk and better access to foreign credit markets. Hence the credit demand in such countries performs much higher elasticity on income (GDP) rather than in countries with monetary policy with the internal anchor, say IT. Furthermore there is a tendency that credit markets under exchange rate pegs are subjected to more continuous shocks, while in countries with IT the restoration of the long-term path tends to be quicker. Supply factors and the mechanisms of the central banks influence on credit market are also different among monetary policy regimes. We have also shown that in case of Belarus changing monetary policy will mean changing incentives at the credit market and changing the mechanisms of central bank influence on it. Furthermore we conclude that switching to a new regime (IT) in Belarus will be consistent with further reduction of dollarization in the economy and introducing more effective mechanisms at the credit market and these goals are coinciding with each other.

Keywords: credit booms, inflation targeting, monetary regime, monetary policy, dollarization.

JEL Classisification: E42, E44, E51, E52, E58

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Executive summary:

The paper deals with the credit booms in transition economies under different monetary policy regimes. We have shown that incentives for credit demand may differ under various monetary policy regimes. In countries with a hard peg credit market has more preconditions for rapid shocks and economic agents are more liable to borrow in case of the peg. It might be consequent to different patterns of economic agents' behavior at the credit market in case of hard peg, but not obviously because of the "less than credible monetary policy". In case of lower credibility of monetary policy under the hard peg, the incentives for credit demand change and they are not so much income-based. From this point of view lower income-based demand may occur under any form of the monetary policy that is considered as not credible by the economic agents. However in successful exchange rate pegs an incentive to additional borrowing might origin from the lower exchange rate risk and better access to foreign credit markets. It is correspondent to the fact that such kind of policy as a rule is carried out by the countries that may be classified as small open economies. Hence the demand in such countries performs much higher elasticity on income (GDP) rather than in countries with monetary policy with the internal anchor, say IT. Furthermore there is a tendency that credit markets under exchange rate pegs are subjected to more continuous shocks, while in countries with IT the restoration of the long-term path tends to be quicker.

Supply factors and the mechanisms of the central banks influence on credit market are also different among monetary policy regimes. In hard peg countries the growth of credit to real sector due to bank credit channel tends to be more significant than in case of IT, while in case of FFIT interest rate policy of the central bank matters in a bigger extent. These reveal the core of the operational level of these regimes, when the interest rate is the operational anchor for economic agents under the IT, while the balance of the internal currency market is crucial for the exchange rate peg regime. However we admit that in the context of Eastern European transition countries these differences are mitigated due to converging monetary policy because of the planned joining to the European monetary union.

We have also shown that in case of Belarus changing monetary policy will mean changing incentives at the credit market and changing the mechanisms of central bank influence on it. In case if Belarus switches to IT regime it means that the incentives at the market will be changed more to the interest rate ones. As for incentives connected with income, they may even grow despite transition from the exchange rate context, because current income based incentives are much lower rather than in a benchmark exchange rate framework. Furthermore, the logic of other countries shows that in case of IT credit market is much less liable to shocks and these shocks are much shorter. It means that instead 'administrative' tools NBB will acquire much more effective indirect tools for transmitting its policy to the credit market. The growth rates of credit in Belarus may substantially lower as a result of switching to a new regime, mainly because of the 'administrative' loans. But however elimination of such tools is the necessary assumption for switching to IT. Furthermore we conclude that switching to a new regime (IT) in Belarus will be consistent with further reduction of dollarization in the economy and introducing more effective mechanisms at the credit market and these goals are coinciding with each other. In regard to twofold goal of stabilizing credit market and reduction of dollarization level we suppose that a gradual shift to a new monetary policy regime is more worthwhile, as it will allow to prevent high volatility of the exchange rate, which is crucial from the point of view of dollarization and transmitting desired incentives to the economic agents.

Contents

Introduction

Since the beginning of the 1990s, an increasing number of developed countries have introduced inflation targeting (IT) as their monetary policy regime and making low inflation the primary objective of monetary policy. This is based on the consensus view in economics that price stability is an important prerequisite for sustainable real economic growth, and central banks should thus direct their policies at achieving this goal, subordinating other, potentially conflicting objectives. Due to this consensus many of transition and developing countries joined this tendency (switching to IT regime), e.g., Czech Republic, Hungary, Poland, Chile, Peru and other. Furthermore, plenty of countries are planning to switch to this regime in near future and making preparations and thus shifting to so called IT Lite. This international experience has also sparked an active discussion in CIS countries. Belarus plans changes in the monetary policy regime and a shift to a future direct IT framework as well. The legislative basis for the future introduction of IT in Belarus is the "Program of Banking Sector Development in the Belarusian Economy for 2006-2010". In this document, a future move to direct IT is mentioned, aimed at the second half of this period, and to be introduced in a gradual fashion.

But under the transition agenda a couple of challenges to the successful IT is emphasized by researches, thus making questionable an expediency of implementing to this regime. At the same time switching to IT itself may cause positive changes in monetary environment. For instance, there are grounds to suppose impact of this regime on the level of dollarization of the economy. The latter is the severe characteristics for the monetary environment that causes specific preferences of the economic agents. Taking this in mind in this paper we are going to focus on the case of implementing IT within a dollarized economy, which is the case of Belarus. But alongside with impact of IT on dollarization level we want to encompass a credit to real economy to our analysis.

During recent years there is a common tendency of high credit growth in transition countries. The growth rates (in absolute and relative terms) are different for these countries, which leads to the discussion about the engines of this growth. A number of theoretical reasons may determine these credit booms, either common for all transition economies, or peculiar to individual countries. But understanding the nature of these booms and controlling them is of great interest for central banks. Furthermore a number of studies mention that monetary policy regime might be a factor that either promote higher credit growth, or makes it more moderate. Hence the main agenda of the paper is to find out the impact of monetary policy regime on the dynamics of credit booms and busts. More precisely our motivation is as follows: if monetary policy regimes that assume more discretion in a central bank's policy (say inflation targeting) decelerate credit growth, while those that are more closely connected with the exchange rate commitments facilitate to more rapid credit growth, i.e. that switching to a new monetary policy regime will lead to severely new credit market conditions.

All these problems – (i) switching to an IT regime, (ii) its impact on the dollarization of the economy, (iii) its impact on the credit market – are of concern for monetary authorities in Belarus. Belarusian monetary authorities use exchange rate as a nominal anchor for price stabilization last couple of years. There is a consensus that Belarusian monetary policy regime de-facto may be classified as an exchange rate peg, although with some clauses[2.] Actually monetary authorities in Belarus try to stimulate the credit growth (alongside with reduction of interest rates in real terms) under the condition of the exchange rate peg. Hence high credit growth during last years is considered to be very important by the Belarusian National bank. Furthermore, when switching to a

[2] Before 2008 official monetary policy guidelines set a couple of indicators as ultimate goals of monetary policy, including rate of nominal depreciation to US dollar and Russian ruble and the growth rate of monetary aggregate (M1). There was not de-jure ranking of these goals and all of them were considered as obvious ones. Furthermore, a couple of indicative parameters were approved in monetary policy guidelines, such as interest rate on loans, growth rate of banks' credit to real sector, the level international reserves. De-facto, exchange rate to US dollar was used as a primary goal, while growth rate of credit to real sector and interest rate on loans as secondary ones. Other parameters actually were considered as indicative ones.

new regime[3] a possible impact on the credit market conditions is of great concern for specifically Belarusian central bank, but it may be the case for other transitional countries. As for the new monetary policy regime they need it in order to make carrying out monetary policy more effective and in order to transmit a number of new impulses to the economic agents in monetary environment[4]. But these plans may be corrected if the current problem of dollarization will become a real challenge to the IT regime. But alongside there is one more problem, within the current monetary policy regime the Belarusian credit market has been booming for a long-period, which is greeted by authorities and becomes de-facto one of the monetary policy goals. Hence, if a new regime will result in a new credit market performance, it may be of the National bank of Belarus (NBB) concern and lead to some additional implications for future IT. Hence the impact of monetary policy regime on a credit booms and busts is of extreme practical interest in Belarus. But however this issue is of great theoretical and practical interest in a global scope, while the tendency for credit booms is peculiar to a wide number of countries.

This logic of research is motivated by recent studies dealing with relation among monetary policy, financial and real sector. Few studies are emphasizing recent credit booms in transition countries and linking these booms with a regime of monetary policy (it is supposed that counties operating either form of hard peg support preconditions for higher credit growth rather than those with more floating exchange rates). Furthermore a range of new theoretical concepts has been elaborated justifying different hypothesis on the reasons of credit booms.

Thus we may justify the significance of the research due to solution of the following tasks: (i) to provide assessments of impact of monetary policy (comparative to other factors) regime for the credit market; (ii) to provide further evidence on interaction between adopting of IT and dollarization dynamics, (iii) will provide empirical support to one of the recent theoretical concepts. First two tasks are of vital interest for majority of central banks in CIS countries, while the last one is important from the theoretical side.

The structure of the paper is as follows. In the Section 1 we make a brief literature overview on the problem of adopting IT, credit booms in transition countries and however the dollarization problem. It supposes to provide a framework for further analyses of the research questions. In Section 2 we deal with credit booms under different monetary policy regimes and try to find out what is different in mechanisms of credit supply and demand (i.e. in credit market conditions) for them. Here we use the eclectic models of credit to real sector in transition countries that are relatively comparable from the point of view of the stage of development and try to capture differences in credit market mechanisms that maybe associated with the differences in the monetary policy regimes. In Section 3 we provide an additional evidence for the impact of the monetary policy regime change on the dollarization. In Section 4 we shift to modern theoretical frameworks of the monetary environment and compare our empirical findings with theoretical approaches.

[3] Here we deal with possible consequences of the new monetary policy regime, not focusing on the issue of its expediency. The latter is mainly explained by chronicle balance of payments deficit.

[4] Which might have a number of positive consequences in the scope of the whole Belarusian economy (for more details see Kruk, Kirchner (2007)).

1. Literature review

The issues considered in the paper – impact of IT regime on the credit market condition – assume consideration of two rather separate issues, while the evidence of their joint analysis (i.e. credit booms and different monetary policy regimes) is not so rich. Furthermore, while motivation of this paper is based on the intention of Belarus to adopt an IT regime, we must first deal with the studies on the implementing IT in transition countries. The issue of its impact on the credit market conditions is secondary at the Belarusian agenda, but however this topic is widely discussed in the economic literature nowadays as the individual subject-matter. Hence this second strand of the literature is vital for our analysis as well, which must provide a background for our analysis.

In practice the IT regime can be interpreted in different manner and the monetary policy strategy under the IT can differ among countries, which is shown in Daianu, Lungu (2005) and Mishkin, Schmidt-Hebbel (2001)). In general according Mishkin (2000) IT regime by definition supposes "an information inclusive strategy in which many variables, not just monetary aggregates or exchange rates are used for deciding the setting policy instruments". The core in this regime is the balance between commitment and discretion in a central bank's policy, basing on which classifications of monetary policy regimes are made (Stone, Bhundia (2004)). Because of the number of specific obstacles a country faces with, a substantial amount of the transition and emerging countries actually tend to so called IT Lite (Stone (2002)). Deviations from the theoretical concept of the IT may limit possibilities of exploiting its theoretical advantages. But despite possible deviations from the theoretical concept with the IT Lite, a shift to IT (or IT Lite) implies a number of preconditions for the country (see Kirchner, Kruk (2007)).

The analysis of the expediency of the IT regime for the individual country should start with possible challenges to the theoretical concept of IT. In some cases these specific features may determine ineffectiveness of the IT, thus making questionable an overall expediency of implementing to this regime. For instance a range of peculiarities is stressed for the IT regime in small open economy (e.g. see Gali, Manacelli (2002) and Svensson (1998)), in dollarized economies (e.g. see (Leiderman et al (2006)), in transition agenda (e.g. see Jonas, Mishkin (2003)). Analysis of these risks for switching to IT in Belarus is provided in Kruk, Kirchner (2007). It shows that still there're a couple of possible obstacles for implementing this regime in Belarus. The major risk might be associated with the dollarization issue. One can argue that IT regime is generally not appropriate for the dollarized economy. First, the difference in monetary transmission mechanism should be taken in mind. For instance, domination of the exchange rate channel may weaken the effectiveness of the Belarusian IT regime. On practice full-fledged IT means that central bank as a rule uses interest rate as a dominant instrument of monetary policy, while other monetary indicators (including exchange rate) are maintained as indicative ones, which may be shock absorbers. At the same time pass-through effect from the exchange rate to prices is much higher in dollarized economies rather than in non-dollarized ones. Thus it might be argued that the "classic" design of IT does not work properly in condition of high dollarization, leading to high vulnerability of inflation trend. Second, Leiderman et al. (2006) provide evidence that the balance sheet effect should be taken in mind in dollarized economies. It assumes that while substantial part of banks' and firms' liabilities are nominated in foreign currency and assets are nominated in national currency allowing exchange rate to be the shock absorber may lead to significant negative outcomes. For instance, substantial depreciation of the exchange rate may cause the banks run because of currency mismatching. Moreover it may lead to substantial decline in money demand that may cause reflation notwithstanding the policy instruments used for meeting the target trend. These outcomes are totally opposite to the expected results of depreciation in non-dollarized economy. However, IT under the condition of dollarization has chances to be successful. For instance, Leiderman et al (2006) argue that despite different pass-through effects in dollarized economy, implementing IT regime informs positive signals to the economic agents. More transparent and predictable monetary policy provides lower inflationary expectations and facilitates to inflation decline. Moreover they argue that IT regime itself causes the reduction of dollarization

thus converging the MTM to the "benchmark" one and mitigating possible negative balance sheet effects. Furthermore, the experience of switching to the new regime by other transitional and emerging countries shows that evolutionary approach through the forms of inflation targeting lite may be reasonable in Belarus. Hence in Kruk, Kirchner (2007) is recommended that high dollarization does not mean that IT implementing is inexpedient in overall. At the same time the exchange rate should not be treated as the only absorber of shocks during IT at least at the beginning of the shift towards the new regime.

The second strand of the literature important for our analysis is one dealing the evidence of credit booms and busts in transition countries. The motivation of the studies dealing with credit booms is rather different. First, there is a couple of studies that deal with credit booms in respect to financial and banking crises, tracing credit to real sector as a possible indicator of crises (see for instance, Ottens, Lambregts and Poelhekke (2005)). In this view a search for optimal monetary policy measures in order to prevent the crises are of concern. For instance, Pavasuthipaisit (2007) deals with the optimal monetary policy measures in order to prevent excessive credit growth and finds out that optimal monetary policy should consist in credible commitment by a central bank to keep the rate of return on capital below the trend. A similar approach is shown in Duenwald, Gueorguiev and Schaechter (2005) who deal with credit booms in Bulgaria, Romania and Ukraine, trying to investigate either the rapid credit growth is excessive or not from the macroeconomic point of view. Possible implications for economic and financial stability due to high credit growth has been provided in Hilbers, Pazarbasiouglu and Johnsen (2005).

Another motivation is the search of the theoretical explanation of credit booms. There is an increasing number of studies stressing different reasons for these credit booms. For instance, Backe and Zumer (2005) stress the following groups of reasons from the existing literature: (1) real business cycles caused by technological or term of trade shocks; (2) financial liberalization of an initially repressed financial system; (3) capital inflows triggered by external factors; (4) wealth shocks originating from comprehensive structural reforms. Furthermore, Calvo and Vegh (1999) point out an impact of "less-than-fully credible policies (notably exchange rate based stabilizations)" that may facilitate credit booms. The latter statement attracts more attention nowadays, while countries with currency boards or other forms of hard peg demonstrate notably higher credit growth rates rather than countries with similar conditions but under another monetary policy regime (Backe, Wojcik (2008)). Thus there is an assumption that monetary policy regimes lead to different structure of relationship between financial sphere and real economy. For instance, in countries operating with hard pegs there is a tendency of higher credit booms, rather than in those dealing with regimes closer to IT (Backe, Wojcik (2008)). Closely to this group of studies we may place theoretical studies that might justify this or that major reason for credit booms. For instance, a difference in credit to real sector growth rates between countries with the any form of hard peg and countries with more discretionary monetary policy may be explained because of having explicit money anchor (Libich (2008)) and consequent to changes agents' behavior in money market (Machicado (2008), Rosen (2007)) and in other segments of economy (Hromcova (2003)). Hence there is a number of studies dealing with new tendencies in the monetary sphere that emphasize different theoretical concepts trying to explain credit booms (Rhee (2008), Goodfriend, King (2001)). Here we also must mention a finance-growth strand in the literature that deal with the credit booms at the agenda of financial deepening that spurs economic growth. In these studies, testing of causalities is prior to the current discussion. But however a positive link between finance and growth does not eliminate the agenda of searching for the engines of credit growth. Moreover, some empirical evidence in finance-growth agenda (for instance, see Terrones and Mendoza (2004)) may be controversial to the commonly accepted positive relationships.

From the empirical point of view a number of studies that capture credit to real sector by this or that factor are of our interest. Backe and Zumer (2005) stress the following groups of empirical works: those capturing the demand side of credit growth through GDP, price indices and/or interest rates as explanatory variables. Furthermore, studies dealing with the supply side emphasize

financial positions of banks (banks lending channel) and borrowers (balance sheet channel) as explanatory variables for credit growth. For developed countries both models are applicable. For instance, from the demand side there is a common finding that income and interest rates can satisfactory explains credit demand. As a rule in a long-run relationship the elasticity credit growth on output is higher than 1, which captures financial deepening peculiar for majority of countries. But Backe and Zumer (2005) emphasize here the problem that the reliability of these estimations may be reduced, while difficulties in distinguishing demand and supply factors in econometric specification. Alongside they argue that distinguishing between demand and supply factor might be more difficult, while in majority of empirical studies the credit to non-financial enterprises and households are considered individually (this specification has got advantages of interpreting the contribution to credit growth by different economic agents and distinguish the factors that alter to households and enterprises individually).

As for the studies on the econometric explanation of lending booms for European transition countries it is not so wide. For instance, Cotarelli et al (2003) elaborates a model of private sector credit-to-GDP ration as an endogenous variable with GDP per capita, public debt-to-GDP, inflation, financial liberalization and legal origin as explanatory variables. They stressed the three groups of countries depending on the expected long-term credit-to-GDP ratios, but all they were not "inconsistent with the structural characteristics of the economies under examination". Overal in regard to transition countries (new EU Member States) Backe and Zumer (2005) stress that "yet there appears to be no widely used "standard" credit demand model which would readily offer itself for an examination (estimable specification) of credit dynamics".

2. Credit booms and monetary environment

2.1. Are credit booms heterogeneous in transition countries?

During last years majority of CEE transition countries have performed high credit growth. As shown above a number of theoretical explanations for these credit booms are used in the economic studies. In our opinion in this or that extent the impact of all these factors might be justified depending on the country's economic condition, stage of development, etc. But however a stylized fact that in countries operating under monetary regime with hard peg credit booms have got preconditions for higher growth ceteris paribus, in our opinion should be learnt more thoroughly. In other words, it means that the monetary regime (at least the alternative IT (IT Lite) or hard peg) might matter for the growth rates of credit to real economy. The latter might be considered as the hypothesis to test.

Theoretically we may justify this hypothesis by the following mechanisms. First, (similar to Calvo and Vegh (1999)) we may suppose that in the case of the hard peg, the monetary regime might be considered by the economic agents as "less-than-fully credible", it may be an incentive for economic agents to increase their borrowings in comparison to fully credible regime. This motivation may be considered as speculative one due to low credibility of the monetary policy regime. Furthermore, as shown in Calvo and Vegh (1999) in this case, factors mentioned above[5] might have more impact on the economic agents' credit demand behavior. In respect to the possible explanatory variables of the credit growth this effect might express either in higher credit-to-GDP elasticity in the long run and perhaps in a bigger effect of other special factors of credit growth. Furthermore, these different patterns of economic agents' behavior might result in higher fluctuations of the credit market in case of hard peg ceteris paribus.

Second view for theoretical justifying the hypothesis of higher credit growth in hard peg monetary regimes is the supply side. In case of IT, interest rate is a prior tool for the central bank and in order to transmit the desired impulses of the official interest rate to the money market, it

[5] (1) real business cycles caused by technological or term of trade shocks; (2) financial liberalization of an initially repressed financial system; (3) capital inflows triggered by external factors; (4) wealth shocks originating from comprehensive structural reforms

should solve the prior task of the effective forecast of the liquidity flows (see Kruk, Kirchner (2007)). This automatic mechanism under the IT agenda makes reserve money supply more predictable and hence the banks positions are also seem to be more stable. However in case of the any form of the hard peg the commitment of the central bank is particularly different and supposes only maintaining of the definite level of the exchange rate. In this case, interest rate and reserve money supply play a role of shock-absorbers (not ultimate and operational goal as in case of the IT). Hence, the liquidity regulation at the prior money market is not so predictable and homogenous, which may inform substantial changes to the banks' net positions. Moreover in case of the monetary non-autonomy (say currency board), the reserve money supply is absolutely automatic process that may disturb net banks' positions substantially, for instance in case of substantial foreign investment or borrowing inflow. Both these will lead to the increase of the credit to the economy through the narrow bank-lending channel. In regard to possible explanatory variables of the credit growth these processes might be captured in higher elasticity of credit to real sector on reserve money and net foreign assets[6].

Hence, we may capture the different impact of different monetary policy regimes on the credit growth through both demand and supply factor of credit to real sector. But however, an applied problem must be admitted here. The difference in elasticity of credit-to-GDP and credit-to-reserve money (net foreign assets) for countries with different monetary policy regimes will not be a formal and strict prove of the impact of the monetary policy regime. This difference might also be explained by other factors peculiar to the countries. But however we can use such an approach interpreting the results as, at least, stylized facts for countries with IT and hard pegs regimes.

Thus the general methodology of the further estimations is as follows. We elaborate an eclectic model of credit to real sector with both supply and demand factor, according to specification (1).

$$crs = F(rgdp, cpi, mm\_r, rm, nfa, D) \qquad (1),$$

where crs – credit to real sector, rgdp – real GDP (as proxy of income dynamics), cpi – inflation (consumer price index), mm_r[7] – money market rate (nominal), rm – reserve money, nfa – net foreign assets of monetary authorities, D – dummies (other factors).

We use this specification for transition countries with relatively comparable stage of development with different monetary policy regimes. In the context of our discussion we chose the following range of countries that according Stone and Bhundia (2004) may be classified by different groups of monetary policy regimes: (1) Czech Republic, Hungary, Poland – IT; (2) Belarus, Latvia – exhange rate peg; (3) Estonia, Lithuania – monetary non-autonomy[8].

Depending on the dynamic data characteristics (see 2.2) we choose the corresponding specification for an individual country. According to our hypothesis we suppose that credit-to-GDP elasticity will be lower in the first group of countries and higher in the second and third ones. The same is expected on the elasticity of the reserve money or net foreign assets of the monetary authorities. Furthermore, in case of error-correction mechanism we may expect more rapid restoration of the equilibrium of the credit market in first group of countries.

2.2. Data analysis

The quarterly data according to (1) has been used for further analysis (see Table 1).

[6] One of these variables might be used in the econometric specification, while they are connected by the identity. However, we may suppose that in countries with hard peg this process might be more evident through reserve money variable, while in those with monetary non-autonomy the dynamics of the net foreign assets will be of greater importance.

[7] In cases when the money market rate is not available we used other interest rates. Furthermore, in some cases money market rate in real terms was used (rmmr).

[8] Groups 2 and 3 we may consider as the only one with the exchange rate peg, but however there is a number of distinctions between there regimes, which might be valuable for the further analysis.

Table 1. Sources and Characteristics of the Data.

Country	Variables	Sample	Sources
Czech Republic	crs, rgdp, cpi, hcpi[1], mm_r, rm, nfa	2000q1 – 2008q1[2]	International Financial Statistics (IFS), Eurostat
Hungary	crs, rgdp, cpi, hcpi, disc_r[3], rm, nfa	2000q1 – 2008q1	IFS, Eurostat
Poland	crs, rgdp, cpi, hcpi, mm_r, rm, nfa	2000q1 – 2008q1	IFS, Eurostat
Belarus	crs, rgdp, cpi, ref_r[4], rm, nfa	2000q1 – 2008q1	IFS, NBB
Estonia	crs, rgdp, cpi, hcpi, mm_r, rm, nfa	2000q1 – 2008q1	IFS, Eurostat
Latvia	crs, rgdp, cpi, hcpi, mm_r, rm, nfa	2000q1 – 2008q1	IFS, Eurostat
Lithuania	crs, rgdp, cpi, hcpi, mm_r, rm, nfa	2000q1 – 2008q1	IFS, Eurostat

Notes: 1 – harmonized CPI according to ECB methodology was used for those countries, where it is available.
2 – the sample for the Czech Republic was reduced to 2002q1 – 2008q1, or 2002q1 – 2007q4 in some tests because of the ambiguous and non-stable results of testing
3 – disc_r – central bank discount rate was used for Hungary, while money market rate is not available in IFS database.
4 – ref_r – central bank refinancing rate was used for Belarus, while money market rate is not available in statistical databases.

The first step of data analysis was testing it for seasonality[9]. As a rule, test for such variables as crs (exept Czech Republic), rgdp and hcpi (cpi) showed an evidence of the seasonality at the 1 percent level. The corresponding seasonally adjusted variable has been aliased by _sa index.

The next step is testing the order of integration of the variables. In order to analyse the order of integration of the variables, the Augmented Dickey-Fuller (*ADF*) unit root test has been employed. It is based on the following regression:

$$\Delta y_t = \mu + \delta T + \alpha y_{t-1} + \sum_{i=1}^{n} \beta_i \Delta y_{t-i} + \varepsilon_t , \qquad (2)$$

where Δ is difference operator, $\mu, \delta, \alpha, \beta$ are regression coefficients, T is trend, ε_t is residuals. The following null hypothesis is tested: $H_0 : \alpha = 0$. When this hypothesis cannot be rejected, then the series is non-stationary (an alternative hypothesis is that the series is stationary). The null hypothesis is tested by comparing *t*-statistic of coefficient α to its critical value (Dickey, Fuller (1979))[10].

The following algorithm has been used to test the order of integration by using the *ADF*-test. First, regression equations have been used (2) excluding a component $\sum_{i=1}^{n} \beta_i \Delta y_{t-i}$ with constant and trend, with constant (no trend), and, finally, without both constant and trend. The results of the dynamic characteristics of the data are provided in Table 2.

Table 2. The Dynamic Characteristics of the Data and Order of Integration.

Variables[1]	Levels		First differences	
	t-ADF[2]	Specification[3]	*t-ADF*	Specification
crs_sa (Czech Rep)	-1.00(0)	t, c	-4.76***(0)	t, c
crs_sa (Hungary)	-2.31(0)	t, c	-4.22*** (0)	c
crs_sa (Poland)	3.51 (0)	c	-4.00*** (0)	c
crs_sa (Belarus)	-8.35*** (0)	t, c		
crs_sa (Estonia)	19.75 (0)	-	-0.90 (2)[4]	-

[9] Seasonality has been tested by using the U.S. Census Bureau's X12 seasonal adjustment program in EViews 6.0 (X12ARIMA estimation)
[10] In case of ambiguous results additional Phillips-Perron and Dickey-Fuller GLS tests have been conducted.

Variables[1]	Levels		First differences	
crs_sa (Latvia)	-10.1*** (7)[5]	t, c	-4.14*** (7)	c
crs_sa (Lithuania)	-3.16* (0)	t, c		
rgdp_sa (Czech Rep)	-1.65 (1)	t, c	-2.74 (0)[6]	t, c
rgdp_sa (Hungary)	7.53 (0)	-	-4.67*** (0)	c
rgdp_sa (Poland)	2.34 (0)	c	-5.12*** (0)	c
rgdp_sa (Belarus)	-3.45* (0)	t, c	-5.52*** (0)	c
rgdp_sa (Estonia)	8.10 (0)	-	-3.96*** (0)	c
rgdp_sa (Latvia)	8.68 (0)	-	-3.94*** (0)	c
rgdp_sa (Lithuania)	-4.41*** (0)	t, c		
cpi_sa (Czech Rep)	1.22 (0)	c	-1.66 (0)[7]	c
cpi_sa (Hungary)	-4.12* (8)[8]	t, c	-2.67* (0)[9]	c
cpi_sa (Poland)	-3.54* (1)[10]	t, c	-2.62* (0)[9]	c
cpi_sa (Belarus)	-2.97* (1)[10]	t, c	-3.49***(0)	-
cpi_sa (Estonia)	2.45 (1)	-	-2.08 (0)[7]	c
cpi_sa (Latvia)	2.35 (1)	-	1.33 (0)	-
cpi_sa (Lithuania)	2.91 (1)	-	-1.55 (0)	t, c
hcpi_sa (Czech Rep)	1.34 (0)	c	-2.84* (0)	C
hcpi_sa (Hungary)	-4.34** (1)[8]	c	-1.98 (8)[9]	c
hcpi_sa (Poland)	-3.39* (1)[10]	t, c	-2.78* (0)[9]	c
hcpi_sa (Estonia)	2.93 (0)	c	-1.79 (0)	c
hcpi_sa (Latvia)	1.74 (1)	-	-1.58 (0)	t, c
hcpi_sa (Lithuania)	2.47 (1)	-	1.13 (3)	-
rm_sa (Czech Rep)	-0.31 (0)	-	-5.78*** (0)	-
rm_sa (Hungary)	-3.12 (0)	t, c	-5.31*** (1)	c
rm_sa (Poland)	-2.66 (8)	t, c	-8.36*** (0)	c
rm_sa (Belarus)	-3.87** (0)	t, c		
rm_sa (Estonia)	-2.18 (0)	t, c	-4.66*** (0)	c
rm_sa (Latvia)	4.60 (0)	-	-1.67* (1)	-
rm_sa (Lithuania)	-3.87** (0)	t, c		
nfa (Czech Rep)	-2.03 (1)	c	-4.55*** (0)	-
nfa (Hungary)	-2.31 (0)	t, c	-5.67*** (0)	c
nfa (Poland)	-3.42* (0)[11]	t, c		
nfa (Belarus)	-5.13*** (0)	t, c		
nfa (Estonia)	-2.27 (0)	t, c	-4.75*** (0)	c
nfa (Latvia)	4.40 (0)	-	-4.80*** (0)	c
nfa (Lithuania)	-3.19* (0)	t, c		
mm_r (Czech Rep)	-0.77 (1)	-	-3.27*** (0)	-
disc_r_sa (Hungary)	-3.15 (0)	t, c	-5.13*** (0)	-
mm_r (Poland)	-1.06 (1)	-	-1.99** (0)	-
repo_r (Poland)	-1.30 (1)	-	-2.52** (0)	-
ref_r (Belarus)	-4.87*** (0)	-		
mm_r (Estonia)	2.15 (0)	t, c	-3.59** (0)	t, c
mm_r (Latvia)	-2.41 (0)	c	-5.33*** (0)	-
mm_r (Lithuania)	-0.46 (0)	-	-6.74*** (0)	-

Notes: 1 – natural logs of the variables were used.
2 – ADF-test t-statistics, *, **, *** - denotes significance at 10, 5 and 1% level correspondingly; lag order is given in parenthesis.
3 – Denotes the specification used in ADF-test: t – trend, c – constant.
4 – Phillips-Perron and Dickey-Fuller GLS tests (including constant in specification) rejects the hypothesis of a unit root at the 1% and 10% level correspondingly. Hence, the variable is treated as I(1).
5 - Phillips-Perron and Dickey-Fuller GLS tests cannot reject the hypothesis of a unit root at 10% level. Hence the variable is not treated as I(0) and the first difference of the variable is tested.
6 – – Phillips-Perron test rejects the hypothesis of a unit root at 5% level. KPSS test cannot reject the hypothesis of staionarity. Hence, the variable is treated as I(1).
7 – DF-GLS test rejects the hypothesis of a unit root at 10% level. KPSS test cannot reject the hypothesis of staionarity.
8 – DF-GLS test and Phillips-Perron cannot reject the hypothesis of a unit root (at 10% level). While the graph of the series is visually more peculiar to non-stationery (in level) we test it for unit root in first difference.
9 – DF-GLS test rejects the hypothesis of a unit root at 5% level. According to KPSS-test the hypothesis that the series is stationary (1st difference) cannot be rejected. Thus we treat this variable as I(1).
10 –.DF-GLS-test cannot reject the hypothesis of a unit root (at 10% level). While the graph of the series is visually more peculiar to non-stationery (in level) we test it for unit root in first difference.

11 - Phillips-Perron test rejects the hypothesis of a unit root at 10% level, while DF-GLS test rejects it at 5% level. Hence the series is treated as I(0).

The tests show that the majority of the used variables are non-stationary of the first order of integration (I(1))[11]. Some substantial distinctions in data characteristics may be seen for Belarus and Lithuania[12], where many economic variables may be treated as the stationary ones and hence long-run relationships in levels may be used here. However these characteristics of data give grounds for using error-correction model specification for majority countries.

2.3. Methodology of equations estimation

Since the majority of the variables are non-stationary ($I(1)$), there could exist the long-run relationship among them. In this case, analysis of short-run relationships between the variables should be implemented taking into account an error correction mechanisms.

In this paper, the long-run relationships have been analyzed by using the two-step Engle-Granger method (Engle, Granger (1987)). This model has been chosen because of the sample size (no more than 33 observations have been available), and its relative simplicity. First, the following equation has been estimated:

$$y_t = \mu + \delta T + \sum_{j=1}^{k} \beta_j x_t^j + u_t, \qquad (3)$$

where μ, δ, β are regression coefficients, T is time trend, u_t is error term. Second, residuals from the equation (3) have been tested with the Dickey-Fuller test[13] (in (2) specification without trend, intercept, and lag structure). This is a test for the long-run relationship (cointegration) (H_0: there is no cointegration exists). If the null hypothesis is rejected, i.e. variables y and x^j are cointegrated, then the short-run dynamics of the dependent variable should be analyzed within the error-correction model. The error-correction mechanism (ECM_t) is equal to the residuals of the equation (3):

$$ECM_t = u_t = y_t - (\mu + \delta T + \sum_{j=1}^{k} \beta_j x_t^j) \qquad (4)$$

An error-correction model is as follows:

$$\Delta y_t = \alpha + \sum_{i=1}^{n} \varphi_i \Delta y_{t-i} + \sum_{i=0}^{n} \sum_{j=1}^{k} b_{ij} \Delta x_{t-i}^j + \gamma ECM_{t-1} + \varepsilon_t, \qquad (5)$$

where $\alpha, \varphi, b, \gamma$ are regression coefficients, ε_t are regression residuals. In this paper, the 'general-to-specific' approach has been used for error-correction models estimation, i.e. general specification (5) has been gradually reduced to the significant version.

2.4 The role of monetary policy regime in credit booms

The estimated equations (see Table 3 and Appendix 1 for full estimations) reveal rather ambiguous results.

Table 3. Specifications of credit market conditions.

[11] Tests for hcpi (cumulative) shows that this variable for majority of countries is I(2). But according to various studies the inflation (differentials) in the long-run may be considered as the stationary variable, which may be tested as non-stationary in the short-run. Due to this fact, we consider the first difference of hcpi (inflation differentials) for those countries where ADF-test gives no grounds to reject the hypothesis of unit root nevetheless to be I(1).

[12] While a range of variable for Lithuania are demonstrating statinarity at 10% level, we will apply them for both cases of I(0) and I(1).

[13] In this test, special McKinnon critical values for cointegration tests (McKinnon (1991)) are used.

Country	Long-run specification	Long-run elasticity on GDP	Long-run elasticity on interest rate[14]	Long-run elasticity on net foreign assets	Long-run elasticity on reserve money	Number of quarters for the restoration of the equilibrium at the credit market[15]
Czech Republic	crs=f(c, t, rgdp, hcpi, mm_r, rm, d)	5.67 (3.87)[16]	0.09 (0.09)	-	0.28 (-)[15]	1.3 (-0.8) (3(-0.33))[15]
Hungary	crs/cpi=f(c, rgdp, rdisc_r, rm, nfa, d)	2.44	1.56[17]	0.09	0.22	1.5 (-0.65)
Poland	crs=f(c, rgdp, hcpi, rm)	1.58	-	-	0.32	3.1 (-0.32)
Belarus	crs=f(rgdp, ref_r, nfa, rm, d)	0.75	-0.35	0.38	0.03	-
Latvia	crs=f(c, rgdp, disc_r, ex_lat[18])	4.68	-0.28		-0.36[19]	5.3 (-0.19)
Estonia	crs=f(c, rgdp, hcpi, nfa, rm, d)	2.12	-	0.56	-0.35	2.2 (-0.46)
Lithuania	crs=f(c, rgdp, rm, nfa, rmmr)	1.25	-2.04[17]	-0.67	1.99	-

First, there is no clear evidence that in the group of inflation targeters the eleasticity on GDP is substantially higher rather than in the countries with the peg of the exchange rate. On the one hand different specifications of the credit demand in different countries should be taken in mind. But on the other hand different specifications is not the only factor that, for instance, lead to substantially high elasticity of the credit on GDP in Czech Republic, which is much higher than in countries with hard peg as a monetary policy regime. But in case of Czech Republic a shock of credit in 2001 must be admitted and further growth might be interpreted as a recovery growth (see Appendix 2). In our opinion, as the most crucial factor that explains the obtained results a membership (either actual or preparation to it) in the European Exchange Rate Mechanism – 2 should be mentioned. Actually it leads to a number of limitations in the monetary policy in regard to the exchange rate. This results in using a concept of keeping stable the monetary exchange rate[20] even under the condition of official regime being inflation targeting. In other words a central bank may use IT framework for carrying out its monetary policy but alongside it keeps in mind its obligations in respect to maintain an exchange rate vs. Euro within the planned corridor. This operational level is much closer to the context of the IT lite rather than full-fledged inflation targeting (FFIT). At the same time countries being classified (Stone(2002)) as exchange rate peggers or monetary non-autonomies may partially deviate from the strict principle of the currency board and increase money supply due to other channels rather than purchasing foreign currency. From this point of view monetary policy regimes among countries from the EU analyzed are actually not so different. This peculiarity in carrying out monetary policy might be analyzed through the monetary exchange rate (absolute values and growth rates of the monetary exchange rates are given in Appendix 3). From this point of view we may see that the monetary policy is more similar between Latvia and Estonia, which might be interpreted as full-fledged exchange rate peg (the volatility of the monetary exchange rate is rather low and mainly limited within the 10% corridor); Czech Republic, Hungary, Lithuania and Poland, which might be interpreted as closer to

[14] Nominal, if other is not mentioned.

[15] In error-correction model the number of period needed for restoration to the long-term path is the retrieved through the coefficient of the error-correction term in the short-run equation, i.e. 1/c_ecm. We report a number of quarter needed for restoration of the equilibrium and give an ECM coefficient in parenthesis.

[16] For the shortened sample of 2002q1-2008q1.

[17] Real interest rate.

[18] Ex_lat – relationship between reserve money and net foreign assets, which may be interpreted as monetary exchange rate.

[19] The elasticity on monetary exchange rate, i.e. the relation between reserve money and net foreign assets.

[20] We consider monetary exchange rate as the relaionship between reserve money and net foreign assets.

IT lite; where the volatility of monetary exchange rate is rather high and may achieve 20% (if not considering shocks). As for Belarus, from this criterion is differs from other groups while the volatility is extremely high, which is not consistent with full-fledged exchange rate peg. Such peculiarities of the monetary policy carried out may lead us to regrouping of countries. As for the full-fledged exchange rate peggers we may argue about reducing of incentive for credit demand such as "less than fully credible policy". Mainly the credit demand here reacts not to incredibility of the monetary policy regime, but to easier access to borrowing at the external markets due to the peg. Hence the credit market here is less subjected to central bank regulation and more subjected to external shocks and the dynamics of credit markets of the country whose currency is used as a peg. Propensity to borrow is of more transaction incentive and thus it might be correlated with the business cycle, i.e. GDP. Hence, this incentive for credit demand might result in higher elasticity of credit to real sector on GDP. Furthermore, the dynamics of net foreign assets and reserve money, i.e. the supply side here (which is non-autonomous) also matters for the credit growth. Just this picture may be captured for Latvia and Estonia, where the corresponding coefficients are definitely high.

For the countries with the operational level of monetary policy closer to IT lite we may argue about strengthening of the interest rate factors, alongside with weakening reserve money factor (emission policy). As for the GDP elasticity we may assume its lower level rather in hard peggers, just due to domination of internal incentives in the economy and less impact of the foreign financial markets for the domestic agents. Furthermore, in term of less or more credibility of the monetary policy, IT should be more credible and thus it should limit the impact of factors of credit growth rather than mentioned above.

But however if we compare the elasticity on GDP in the long-run between groups of the inflation targeters and exchange rate peggers we cannot see a stable difference for all group members in a used sample of countries. Again it might be the consequence of the preparation measures for ERM-2, which converge incentives for credit demand among countries and carrying out monetary policy. But in order to capture the impact of the monetary regime we may also compare the dynamics of the corresponding coefficients, i.e. their recursive estimates (see Appendix 4). This view shows that these coefficients are rather stable and perform converging dynamics. But nevertheless, the group of exchange rate peggers demonstrates the maximum stability of these coefficients, except Lithuania. In case of Lithuania it may interpreted in terms of the credibility of the monetary policy. When the operational level of the monetary policy became more correspondent with exchange rate peg (it became so after entering the ERM-2 in 2005) it lead to increasing elasticity of credit on GDP, which is corresponding with credit demand incentives in case of the hard peg. In the group of inflation targeters the dynamics of these coefficients is not so stable and for Czech Republic and Hungary it is mainly decreasing, which might mirror empowering the IT environment just in the years when this coefficient went down. However in Poland rise of the coefficient is corresponding with strengthening exchange rate side of the monetary policy just after joining the EU. Hence

In overall these picture supports the assumption that economic agents in monetary policy regimes dealing with hard pegs are more sensitive to borrowing in terms of income. Furthermore, we may see that the supply mechanism (through credit channel) in the group of peggers is more important than otherwise. It mirrors the automatic mechanism of money supply in monetary regimes close to hard pegs.

Furthermore there is one more important argument in favor of assumption that monetary environment of the hard peg is more favorable for the rapid credit shocks. If we compare the period of restoration of the equilibrium in the error-correction model, on the one hand it is difficult to find out a definite causality. But nevertheless we may see that in case of the hard peg (Latvia) the credit market is subsequent to most substantial fluctuations (the period of equilibrium restoration is about 5 quarters), while in case of Hungary it is only 1.5 quarter. The period of restoration of the equilibrium does not show a perfect tendency in respect to other countries, while these coefficients,

say for Estonia and Poland are in the medium range. But nevertheless, the dynamics of these estimates shows the results corresponding with this assumption (see Appendix 5). Except Poland the absolute values of these coefficients is much closer to 1 for inflation targeters, while is closer to 0 in peggers. The convergence between groups is strengthening since 2005 when the changes in the monetary policy of the countries in regard to the European monetary union took place.

In overall at the current stage we may use the stylized fact that in countries with hard peg credit market has more preconditions for rapid shocks and economic agents are more liable to borrow in case of the peg, at least at the beginning of such a policy. It might be consequent to different patterns of economic agents' behavior at the credit market in case of hard peg, but not obviously because of the "less than credible monetary policy". In case of lower credibility of monetary policy under the hard peg, the incentives for credit demand change and they are not so much income-based. Furthermore in hard peg countries the growth of credit to real sector due to bank credit channel tends to be more significant than in case of IT, while in case of FFIT interest rate policy of the central bank matters in a bigger extent. Because of the different patterns of behavior of the economic agents under the different monetary policy conditions, the shocks at the credit markets under the hard peg might be more continued, rather than under FFIT.

3. The level of dollarization and monetary policy regime

3.1. Dollarization: causality and causes

In Section 2 we have shown that monetary environment under the IT regime as a rule provides conditions for more moderate credit growth rather than monetary regime based on the exchange rate peg. But herewith we must admit an important distinction among the incentives at the credit markets. In cases of the hard peg two types of incentives may dominate: (i) borrowing under the precondition of incredible monetary policy; (ii) borrowing under the precondition of better access to capital. This partial change in incentives might be the case for instance between Lithuania and Estonia. Under nominally similar monetary policy framework, actually their operational policy differ, which results in substantially higher income-based incentives for borrowing in Estonia. These incentives of economic agents are crucial when the analysis of credit market is undertaken in a dollarized economy.

In a dollarized economy exchange rate peg might be successful tool for reducing the level of dollarization, which is pretty good approved by the Belarusian dynamics (see Appendix 6). This reduction of the dollarization level was accompanied by high credit growth, with much bigger growth rates rather than in other countries considered. But today the issue of changing the monetary policy regime is on the agenda. In this view credit market conditions are also at the agenda, while providing high credit growth is considered to be one of the National bank of Belarus (NBB) goal. The problem may be formulated as twofold: what is the impact of the new monetary policy regime on the dollarization level and its impact on credit market dynamics. The potential threats might be formulated as follows: initial rapid credit growth under any regime different to the exchange rate peg might result in increase of a dollarization level and hence these goals will become contradictory.

First we focus on dollarization and its dynamics under changing monetary policy regime. One can argue that IT regime is generally not appropriate for the dollarized economy. First, the difference in monetary transmission mechanism should be taken in mind. IT regime by definition supposes "an information inclusive strategy in which many variables, not just monetary aggregates or exchange rates are used for deciding the setting policy instruments[21]". On practice it means that central bank as a rule uses interest rate as a dominant instrument of monetary policy, while other monetary indicators (including exchange rate) are maintained as indicative ones, which may be shock absorbers. At the same time pass-through effect from the exchange rate to prices is much

[21] Mishkin (2000).

higher in dollarized economies rather than in non-dollarized ones. Thus it might be argued that the "classic" design of IT does not work properly in condition of high dollarization, leading to high vulnerability of inflation trend. Second, the balance sheet effect should be taken in mind in regard to dollarized economies[22]. It assumes that while substantial part of banks' and firms' liabilities are nominated in foreign currency and assets are nominated in national currency allowing exchange rate to be the shock absorber may lead to significant negative outcomes. For instance, substantial depreciation of the exchange rate may cause the banks run because of currency mismatching. Moreover it may lead to substantial decline in money demand that may cause reflation notwithstanding the policy instruments used for meeting the target trend. These outcomes are totally opposite to the expected results of depreciation in non-dollarized economy. However, IT under the condition of dollarization has chances to be successful. For instance, Leiderman et al (2006) argue that despite different pass-through effects in dollarized economy and non-dollarized one, implementing IT regime informs positive signals to the economic agents. More transparent and predictable monetary policy provides lower inflationary expectations and facilitates to inflation decline. Moreover they argue that IT regime itself causes the reduction of dollarization thus converging the MTM to the "benchmark" one and mitigating possible negative balance sheet effects. So at the current stage we may argue about the following causality: (i) a dollarized economy is a precondition for implementing the monetary policy regime based on the peg of the exchange rate, while IT regime might be questionable due to different pass-through effects from exchange rate to prices in dollarized and non-dollarized economy. But as shown in Kruk (2008) the channels of monetary transmission in Belarus are sensible to the type of the monetary policy being carried out. From this point of view we may argue that implementing IT regime in Belarus per se may lead to reduction of the dollarization level and changing incentives of the economic agents. But the main implication here it is possible avoiding of sudden exchange rate shocks during switching to a new regime. However these incentives at least at the credit market as shown above are also consistent with the type of monetary policy.

The estimated equation for Belarus (see Appendix 1) shows that incentives of economic agents at the credit market are substantially different from those agents in other countries analyzed either exchange rate peggers or inflation targeters. A substantial part of the credit growth is explained due to the time trend since 2006, which captures the 'administrative' crediting in Belarusian economy. Furthermore, the demand for credit in Belarus is much less income-based rather than in countries with either exchange rate peg or IT. At the same time the mechanisms of central bank influence on it are consistent with the monetary environment under the exchange rate peg. However, substantial distinction in the credit market mechanisms of supply and demand is the mechanism of shocks at the credit market. The corresponding variable for Belarus is stationary that depends on a certain factors in the long-run, which assumes less liability to shocks. It might be again the consequence of the 'administrative' crediting, which by definition restores the market from disequilibrium while it was not impacted by changed behavior of the economic agents. In terms from Section 2 mainly it might characterized as borrowing under 'less than credible monetary policy', while in comparison to other countries with exchange rate peg Belarusian policy was much more discretionary until recently. In respect to exchange rate peg it might be characterized as implicit exchange rate peg. Its operational parameters (say, monetary exchange rate) converged to the level of other countries only in the second part of 2007. Thus changing monetary policy for Belarus will mean changing incentives at the credit market and changing the mechanisms of central bank influence on it. In case if Belarus switched to the hard peg, it would lead to more income-based incentives from the side of the economic agents, while from the supply-side the factor would kept unchanged. But while Belarus plans to switch to IT regime it means that the incentives at the market will be changed more to the interest rate ones. As for incentives connected with income, they may even grow despite transition from the exchange rate context, because current income based incentives are much lower rather than in a benchmark exchange rate framework.

[22] Leiderman et al (2006)

Furthermore, the logic of other countries shows that in case of IT credit market is much less liable to shocks and these shocks are much shorter. It means that instead 'administrative' tools NBB will acquire much more effective indirect tools for transmitting its policy to the credit market. It should be emphasized that absolute values of credit growth in Belarus may substantially lower as a result of switching to a new regime, mainly because of the 'administrative' loans. But however elimination of such tools is the necessary assumption for switching to IT (see Kirchner, Kruk (2007)).

3.2. Implication for Belarusian IT regime

Above we showed that a sudden switch to FFIT regime is not worthwhile for Belarus at least at the initial stages[23], while at the same time the high vulnerability of exchange rate should be prevented and the reliable forecast of inflation (see Kruk (2008)) should be provided. Through this for shaping the strategic issues we initially will choose the possible and most proper for Belarus design (the relationships of targets and operational tools) of monetary policy during first steps towards the IT regime.

Referring to the international experience regarding countries with dollarized and/or open economy in addition to "classic" design of IT regime some researchers point out few more strategies of monetary policy that in higher or less extent deal with IT (see Table 4).

Table 4. Alternative Monetary Policy Designs

	Full-Fledged Inflation Targeting (FFIT)	Intermediate Inflation Targeting (IIT)	Fear of Floating Competitiveness Targeting (FFCT)
Primary final target	Inflation	Inflation	Competitiveness
Secondary final target	Competitiveness	Competitiveness	Inflation
Operational target	Interest rate	Monetary aggregate	Rate of crawl
Primary shock absorber	Exchange rate	Interest rate	Foreign assets
Secondary shock absorber	Foreign assets	Exchange rate/Foreign assets	Interest rate

Source: Leiderman et al (2006)

In the FFCT case and partially in the IIT case there is a possibility of preventing high vulnerability of external competitiveness that is severe under the condition of open economy. Moreover focus on these regimes coincides with potentially high pass-through effect of exchange rate (FFCT in a greater extent, IIT in lower extent). Argues against these designs may be as follows. First, it does not fully coincide with IT definition when inflation is treated as the only and dominant ultimate goal. Second, it may weaken the "automatic" character of the monetary policy and thus its transparency and public support. Herewith the factor of credit demand may change unpredictably. Moreover, the impact of dollarization and high importance of external competitiveness are still crucial for Belarus. Furthermore, absolutely "automatic" monetary policy looses a part of its potential of absorbing and preventing shocks.

Thus, in our opinion, at the first stages of IT regime the choice should be made between FFCT and IIT (i.e. IT lite). The experience of majority countries shows that the direct shift to IT is rather risky and they used initial step to IT lIte and accepting FFIT only after that (Stone (2002), Stone, Bhundia (2004)). Initial choice should be done in favor of FFCT, while it includes the importance of exchange rate in more suitable for Belarus manner. If this policy becomes a factor of more stable economic agents' behavior and the rate of dollarization as well the exchange rate pass-through effect decline, a further shift to IIT is possible. However, this shift has to be made in a

[23] This conclusion is much in depending on the time of shifting to the IT regime. The program "Banking Sector Development in 2006-2010" foresees this shift during the last years of this period without fixing more narrow time interval. But nevertheless its doubtful that all the factors mentioned – dollarisation, openness of economy and transitional context – may alter its impact in predicable future before implementing the IT regime.

gradual manner because of the factors mentioned, which also govern its speed. In case adverse shocks do not allow a quick transition towards full IT, the time period for reaching it needs to be extended and used for the establishment of the necessary requirements.

Thus we may argue that switching to a new regime (IT) in Belarus will be consistent with further reduction of dollarization in the economy and introducing more effective mechanisms at the credit market and these goals are coinciding with each other. However possible implications for the current policy may lead to decreasing growth rates of credit, but it will mean its adjustment to more efficient and economically based credit demand.

4. Conclusions and directions for further research

In this paper we have analyzed the credit booms in transition economies under different monetary policy regimes. We have shown that incentives for credit demand may differ under various monetary policy regimes. In countries with a hard peg credit market has more preconditions for rapid shocks and economic agents are more liable to borrow in case of the peg. It might be consequent to different patterns of economic agents' behavior at the credit market in case of hard peg, but not obviously because of the "less than credible monetary policy". In case of lower credibility of monetary policy under the hard peg, the incentives for credit demand change and they are not so much income-based. From this point of view lower income-based demand may occur under any form of the monetary policy that is considered as not credible by the economic agents. However in successful exchange rate pegs an incentive to additional borrowing might origin from the lower exchange rate risk and better access to foreign credit markets. It is correspondent to the fact that such kind of policy as a rule is carried out by the countries that may be classified as small open economies. Hence the demand in such countries performs much higher elasticity on income (GDP) rather than in countries with monetary policy with the internal anchor, say IT. Furthermore there is a tendency that credit markets under exchange rate pegs are subjected to more continuous shocks, while in countries with IT the restoration of the long-term path tends to be quicker.

Supply factors and the mechanisms of the central banks influence on credit market are also different among monetary policy regimes. In hard peg countries the growth of credit to real sector due to bank credit channel tends to be more significant than in case of IT, while in case of FFIT interest rate policy of the central bank matters in a bigger extent. These reveal the core of the operational level of these regimes, when the interest rate is the operational anchor for economic agents under the IT, while the balance of the internal currency market is crucial for the exchange rate peg regime. However we admit that in the context of Eastern European transition countries these differences are mitigated due to converging monetary policy because of the planned joining to the European monetary union.

We have also shown that in case of Belarus changing monetary policy will mean changing incentives at the credit market and changing the mechanisms of central bank influence on it. In case if Belarus switches to IT regime it means that the incentives at the market will be changed more to the interest rate ones. As for incentives connected with income, they may even grow despite transition from the exchange rate context, because current income based incentives are much lower rather than in a benchmark exchange rate framework. Furthermore, the logic of other countries shows that in case of IT credit market is much less liable to shocks and these shocks are much shorter. It means that instead 'administrative' tools NBB will acquire much more effective indirect tools for transmitting its policy to the credit market. The growth rates of credit in Belarus may substantially lower as a result of switching to a new regime, mainly because of the 'administrative' loans. But however elimination of such tools is the necessary assumption for switching to IT. Furthermore we conclude that switching to a new regime (IT) in Belarus will be consistent with further reduction of dollarization in the economy and introducing more effective mechanisms at the credit market and these goals are coinciding with each other. In regard to twofold goal of stabilizing credit market and reduction of dollarization level we suppose that a gradual shift to a new monetary policy regime is more worthwhile, as it will allow to prevent high volatility of the exchange rate,

which is crucial from the point of view of dollarization and transmitting desired incentives to the economic agents.

Further research on the issue of credit booms under different monetary policy regime in our opinion need to incorporate panel analysis, which may be the strict approval of the hypotheses discussed in this paper. Estimating the corresponding models for big sample of inflation targeters and exchange rate peggers will give more grounds to state about credit demand and supply incentives under different monetary policy frameworks. Furthermore, research of transmission channels and credit demand models within the single country analysis may enrich the existing evidence as well.

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Appendix 1. Estimation results

1. Czech Republic

Long-run equation:

Number of observations: 33 (2000q1 – 2008q1).

Test for long-term relationship[24]: *t-DF* = –5.64**.

$$\begin{aligned}\text{LOG(CRS)} = &\underset{-8.85}{-28.84} + \underset{-3.44}{0.035}*\text{T} + \underset{9.91}{5.67}*\text{LOG(RGDP\_SA)} - \underset{2.25}{1.65}*\text{LOG(HCPI\_SA)} \\ &+ \underset{2.01}{0.09}*\text{LOG(MM\_R)} + \underset{7.49}{0.28}*\text{LOG(RM\_SA)} + \underset{2.88}{0.10}*\text{T=2008} + u_t\end{aligned} \quad (6)$$

Number of observations: 25 (2002q1 – 2008q1)[25].

Test for long-term relationship[26]: *t-DF* = –5.98***.

$$\begin{aligned}\text{LOG(CRS)} = &\underset{-7.17}{-16.78} - \underset{-3.15}{0.019}*\text{T} + \underset{9.72}{3.87}*\text{LOG(RGDP\_SA)} \\ &+ \underset{1.93}{0.87}*\text{LOG(CPI\_SA)} + \underset{3.78}{0.09}*\text{LOG(MM\_R)} + u_t\end{aligned} \quad (7)$$

Error correction model[27] (corresponding to the equation (6)):

Number of observations: 31.

Tests:

Serial correlation of 1 – 3 order (*LM*-test)[28]: $F = 0.540$;

Test on autoregressive conditional heteroskedasticity (*LM*-test)[29]: $F = 0.586$;

Residuals normality test[30]: *0.003*.

$$\begin{aligned}\text{DLOG(CRS)} = &\underset{4.54}{0.39}*\text{DLOG(CRS\_SA(-1))} + \underset{3.42}{1.35}*\text{DLOG(RGDP\_SA)} \\ &+ \underset{9.34}{0.31}*\text{DLOG(RM\_SA)} - \underset{-4.20}{0.80}*\text{ECM\_CRS(-1)}\end{aligned} \quad (8)$$

Error correction model (corresponding to the equation (7)):

Number of observations: 25.

Tests:

Serial correlation of 1 – 3 order (*LM*-test): $F = 0.500$;

Test on autoregressive conditional heteroskedasticity (*LM*-test): $F = 0.520$;

Residuals normality test: 0.474.

[24] H_0: absence of cointegration (long-term relationship).
[25] Because of the ambigious result one more estimation was done for shorter sample.
[26] H_0: absence of cointegration (long-term relationship).
[27] According to the equation (4), error correction term is equal to the residuals obtained from the long-term equation u_t.
[28] H_0: absence of serial correlation of 1-3 orders.
[29] H_0: absence of *ARCH*-effect.
[30] H_0: the residuals are normally distributed.

$$\begin{aligned}\text{DLOG(CRS)} &= \underset{5.48}{0.37}\text{*DLOG(CRS\_SA(-1))} + \underset{5.49}{1.59}\text{*DLOG(RGDP\_SA)} \\ &+ \underset{12.01}{0.28}\text{*DLOG(RM\_SA)} - \underset{-2.09}{0.33}\text{*ECM\_CRS(-1)}\end{aligned} \quad (9)$$

2. Hungary

Long-run equation:

Number of observations: 33

Test for long-term relationship: *t-DF* = –3.99*.

$$\begin{aligned}\text{LOG(CRS\_SA/CPI\_SA)} &= \underset{11.39}{-13.82} + \underset{11.54}{2.44}\text{*LOG(RGDP\_SA)} + \underset{6.07}{1.56}\text{*LOG(RDISC\_R)} \\ &+ \underset{3.16}{0.22}\text{*LOG(RM\_SA)} + \underset{4.44}{0.09}\text{*LOG(NFA)} + \underset{4.25}{0.06}\text{*(T>2007.25)} + u_t\end{aligned} \quad (10)$$

Error correction model:

Number of observations: 31.

Tests:

Serial correlation of 1 – 3 order (*LM*-test): $F = 0.125$;

Test on autoregressive conditional heteroskedasticity (*LM*-test): $F = 0.202$;

Residuals normality test: 0.568.

$$\begin{aligned}\text{DLOG(CRS\_SA/CPI\_SA)} &= \underset{4.31}{0.02} + \underset{3.97}{1.73}\text{*DLOG(RGDP\_SA)} - \underset{-2.31}{0.83}\text{*DLOG(RGDP\_SA(-1))} \\ &+ \underset{4.66}{0.07}\text{*DLOG(NFA)} + \underset{6.17}{1.38}\text{*DLOG(RDISC\_R)} - \underset{3.61}{0.65}\text{*ECM\_RCRS(-1)}\end{aligned} \quad (11)$$

3. Poland

Long-run equation:

Number of observations: 33

Test for long-term relationship: *t-DF* = –5.11**.

$$\begin{aligned}\text{LOG(CRS\_SA)} &= \underset{-7.69}{-9.54} + \underset{9.36}{1.58}\text{*LOG(RGDP\_SA)} \\ &+ \underset{7.90}{1.31}\text{*LOG(HCPI\_SA)*(T>2006.75)} + \underset{4.19}{0.32}\text{*LOG(RM)} + u_t\end{aligned} \quad (12)$$

Error correction model:

Number of observations: 31.

Tests:

Serial correlation of 1 – 3 order (*LM*-test): $F = 0.662$;

Test on autoregressive conditional heteroskedasticity (*LM*-test): $F = 0.283$;

Residuals normality test: 0.280.

$$\begin{aligned}\text{DLOG(CRS\_SA)} &= \underset{3.00}{0.37}\text{*DLOG(CRS\_SA(-1))} \\ &+ \underset{4.34}{1.65}\text{*DLOG(RGDP\_SA)} - \underset{-1.88}{0.32}\text{*ECM\_CRS(-1)}\end{aligned} \quad (13)$$

3. Belarus

Long-run equation:

Tests:

Serial correlation of 1 – 3 order (*LM*-test): $F = 0.215$;

Test on autoregressive conditional heteroskedasticity (*LM*-test): $F = 0.287$;

Residuals normality test: 0.518

Number of observations: 33

$$\begin{aligned}\text{LOG(CRS\_SA)} &= \underset{18.26}{0.75}\text{*LOG(RGDP\_SA)} - \underset{-7.12}{0.37}\text{*LOG(REF\_R)} \\ &+ \underset{10.96}{0.36}\text{*LOG(NFA)} + \underset{7.31}{0.01}\text{*T(T>2006)} + \underset{3.95}{0.03}\text{*LOG(RM)*(T>2001.75)} + u_t\end{aligned} \quad (14)$$

4. Estonia

Long-run equation:

Number of observations: 33

Test for long-term relationship: *t-DF* = –5.14**.

$$\begin{aligned}\text{LOG(CRS\_SA)} &= \underset{17.74}{-12.97} + \underset{18.07}{2.12}\text{*LOG(RGDP\_SA)} + \underset{10.70}{1.75}\text{*LOG(HCPI\_SA)} \\ &+ \underset{2.59}{0.56}\text{*LOG(NFA)} - \underset{-2.32}{0.35}\text{*LOG(RM)} - \underset{-4.04}{0.06}\text{*((T=2002.25)+(T=2002.5))} + u_t\end{aligned} \quad (15)$$

Error correction model:

Number of observations: 32.

Tests:

Serial correlation of 1 – 3 order (*LM*-test): $F = 0.167$;

Test on autoregressive conditional heteroskedasticity (*LM*-test): $F = 0.985$;

Residuals normality test: 0.673.

$$\begin{aligned}\text{DLOG(CRS\_SA)} &= \underset{10.60}{0.05} + \underset{3.36}{0.75}\text{*DLOG(RGDP\_SA)} \\ &+ \underset{3.17}{0.10}\text{*DLOG(MM\_R)} - \underset{-2.73}{0.46}\text{*ECM\_CRS(-1)}\end{aligned} \quad (16)$$

4. Latvia

Long-run equation:

Number of observations: 33

Test for long-term relationship: *t-DF* = –5.06**.

$$\begin{aligned}\text{LOG(CRS\_SA)} = &-\underset{-60.28}{26.07} + \underset{69.28}{4.68}\text{*LOG(RGDP\_SA)} \\ &-\underset{-4.46}{0.28}\text{*LOG(DISC\_R)} - \underset{-2.32}{0.36}\text{*LOG(EX\_LAT)} + u_t\end{aligned} \quad (17)$$

Error correction model:

Number of observations: 32.

Tests:

Serial correlation of 1 – 3 order (*LM*-test): $F = 0.938$;

Test on autoregressive conditional heteroskedasticity (*LM*-test): $F = 0.745$;

Residuals normality test: 0.590.

$$\begin{aligned}\text{DLOG(CRS\_SA)} = &\underset{2.24}{0.03} + \underset{2.90}{0.40}\text{*DLOG(CRS\_SA(-1))} + \underset{2.82}{0.80}\text{*DLOG(RGDP\_SA)} \\ &+\underset{4.42}{0.18}\text{*DLOG(NFA)} - \underset{-2.35}{0.03}\text{*DLOG(MM\_R(-1))} - \underset{-2.20}{0.19}\text{*ECM\_CRS(-1)}\end{aligned} \quad (18)$$

5. Lithuania

Long-run equation:

Tests:

Serial correlation of 1 – 3 order (*LM*-test): $F = 0.413$;

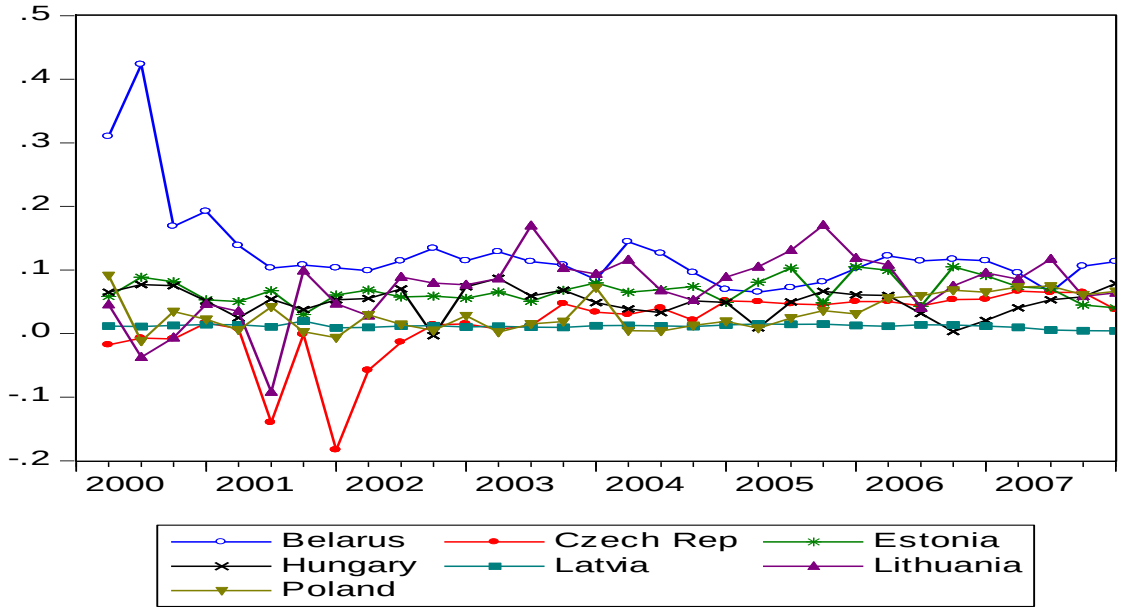
Test on autoregressive conditional heteroskedasticity (*LM*-test): $F = 0.865$;

Residuals normality test: 0.286

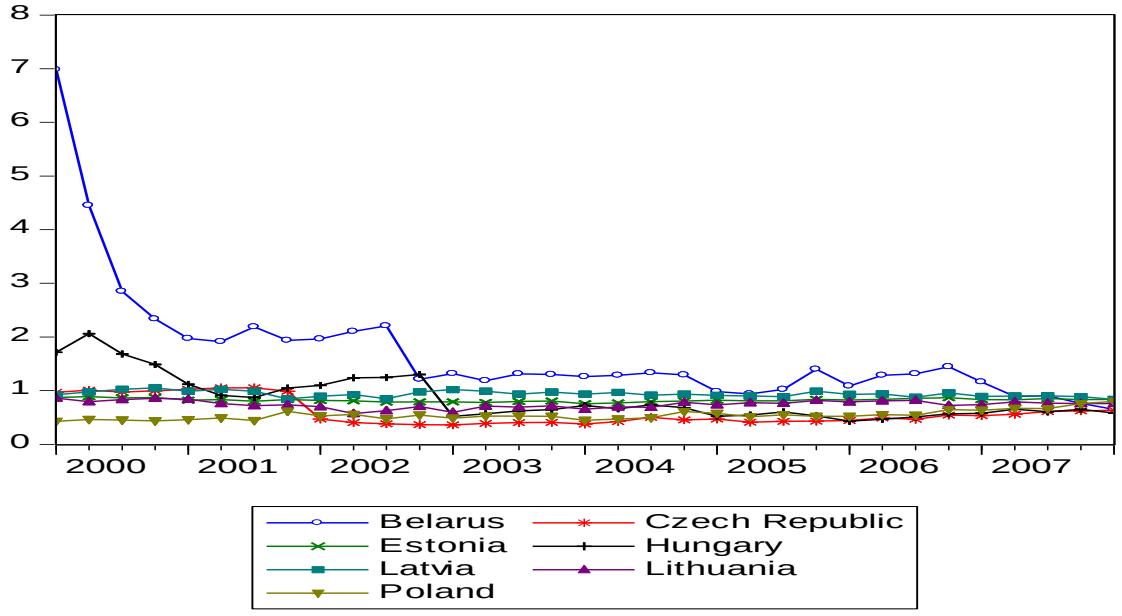
Number of observations: 33

$$\begin{aligned}\text{LOG(CRS\_SA)} = &\underset{-3.29}{-13.77} + \underset{1.71}{1.25}\text{*LOG(RGDP\_SA)} \\ &+\underset{7.63}{1.99}\text{*LOG(RM\_SA)} - \underset{-4.11}{0.67}\text{*LOG(NFA)} - \underset{-2.33}{2.04}\text{*LOG(RMMR)} + u_t\end{aligned} \quad (19)$$

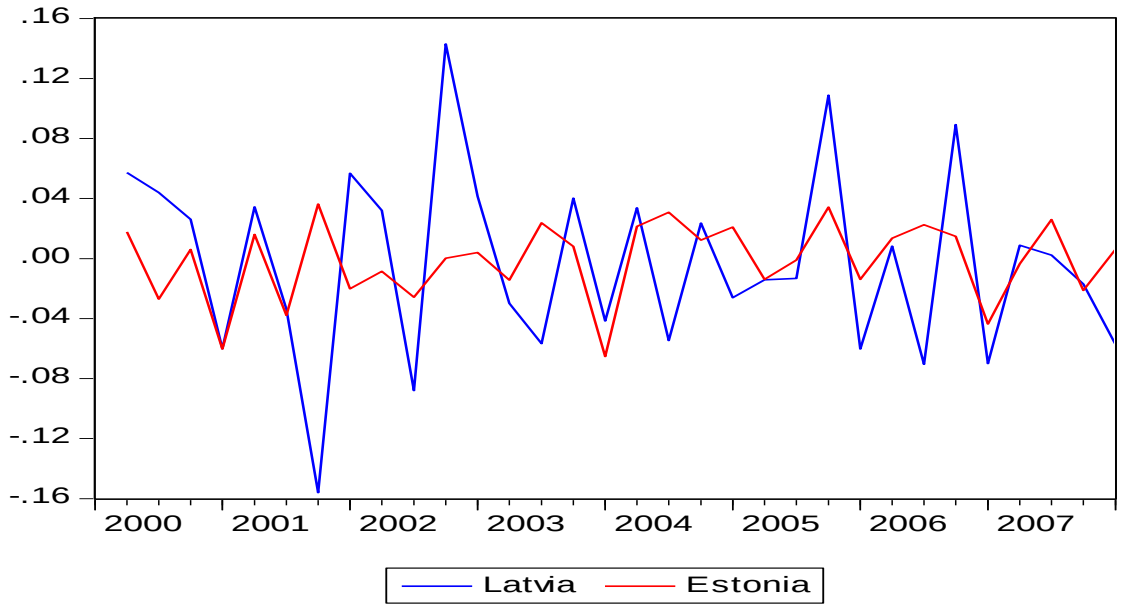
Appendix 2. The growth rates of the credit to real sector (%, quarter on quarter)



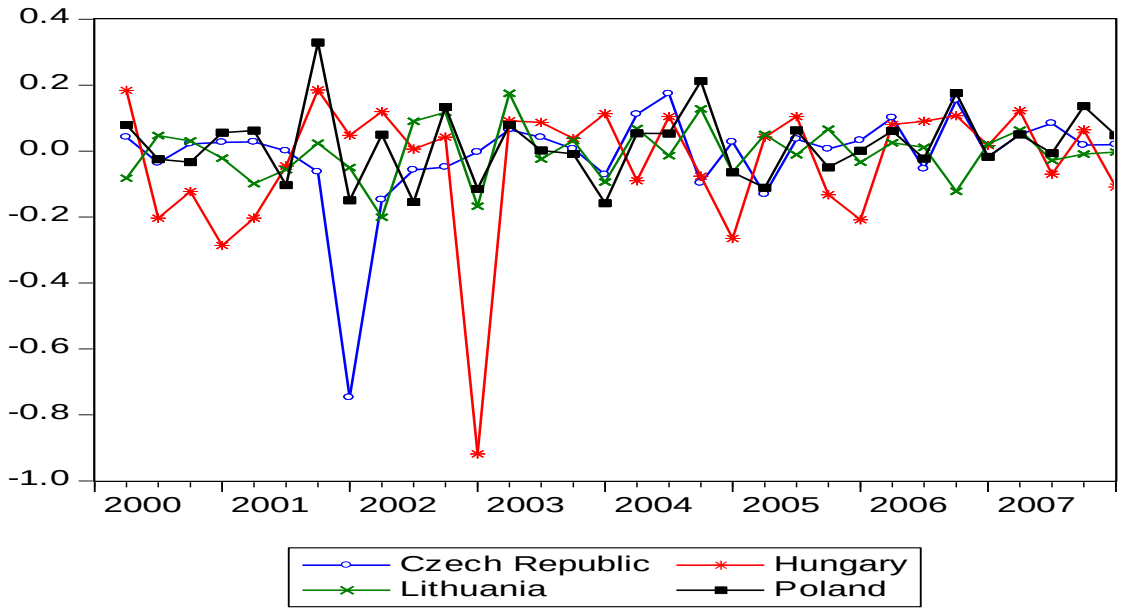
Appendix 3. Monetary exchange rates among the countries



A. Absolute levels of the monetary exchange rates



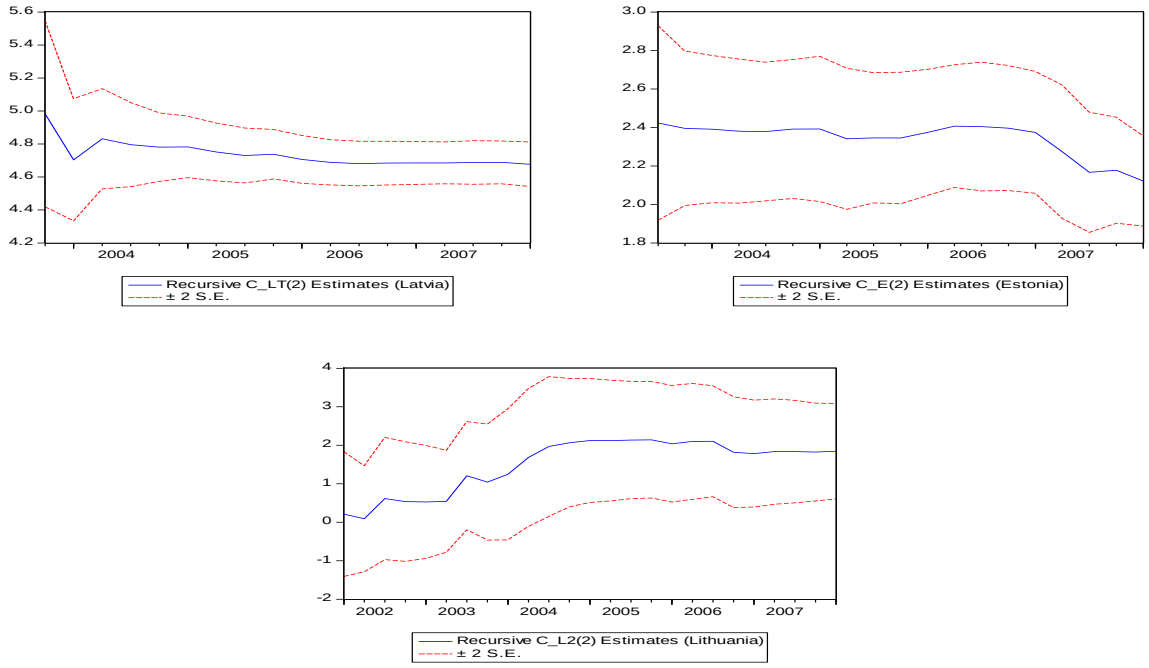
B. Growth rates of the monetary exchange rate in Latvia and Estonia (quarter on quarter)



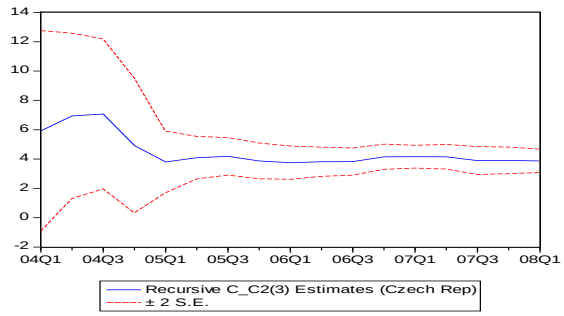
C. Growth rates of the monetary exchange rate in Hungary, Czech Republic, Poland and Lithuania (quarter on quarter)

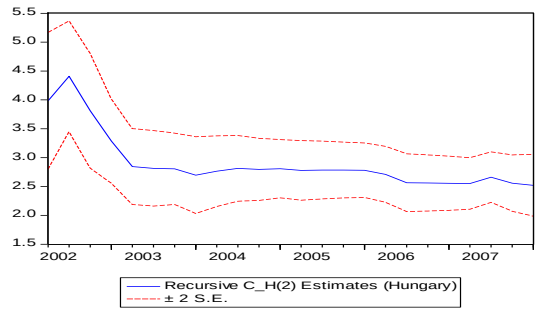
D. Growth rate of the monetary exchange rate in Belarus (quarter on quarter)

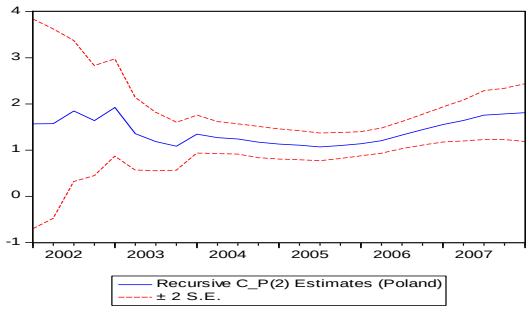
Appendix 4. Recursive estimates of the credit on GDP elasticity in the long-run



A. Recursive estimates of GDP coefficient in the long-run for exchange rate peggers (Latvia, Estonia and Lithuania)

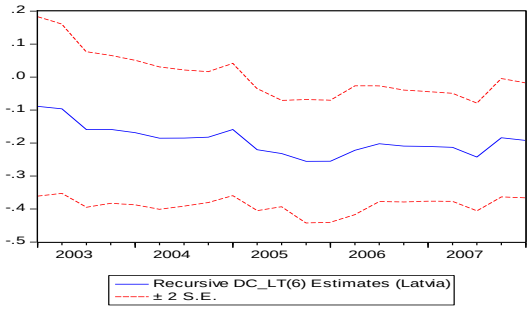


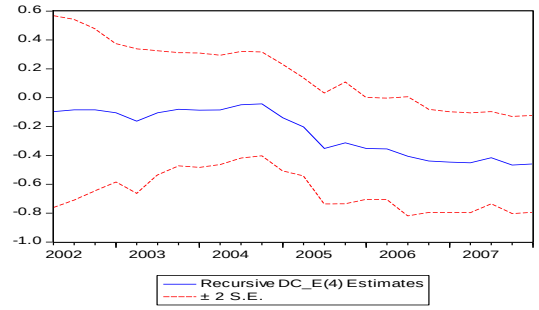




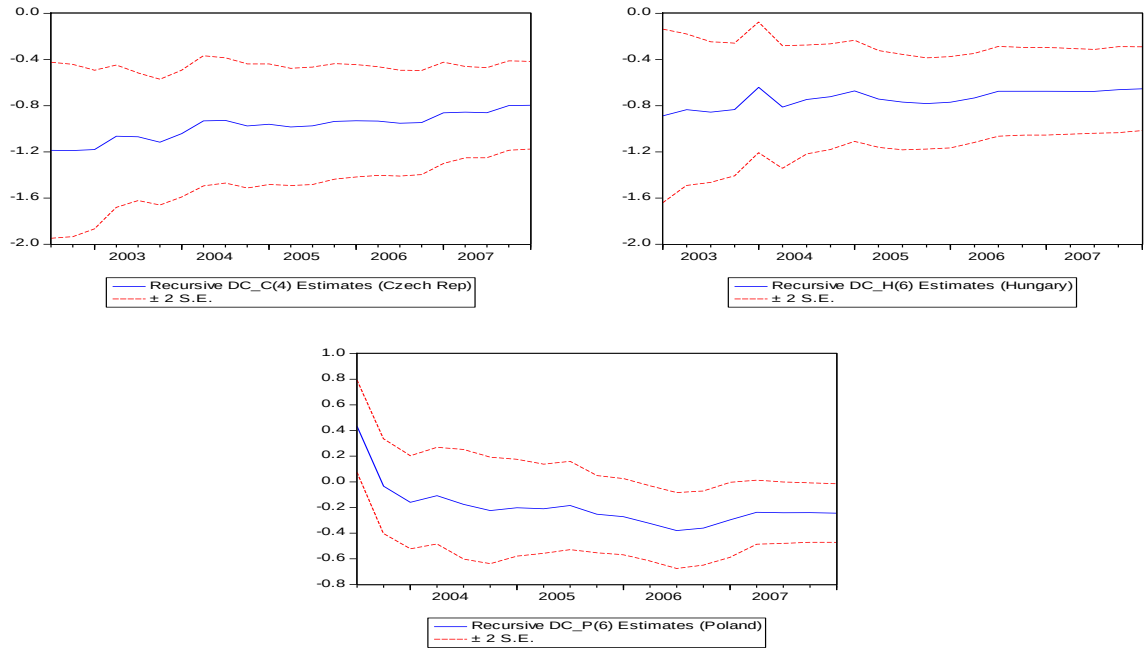
B. Recursive estimates of GDP coefficient in the long-run inflation targeters (Czech Republic, Hungary, Poland)

Appendix 5. Recursive estimates of the error-correction term coefficient.





A. Recursive estimates of the error-correction term coefficient for exchange rate peggers (Latvia, Estonia)



B. Recursive estimates of the error-correction term coefficient inflation targeters (Czech Republic, Hungary, Poland)

Appendix 6. Dollarization and money demand in Belarus.